

factor influencing the regularity in breeding and molt in the Burrowing Parrot. Fruits are significant items in the parrot's diet during the breeding season (Forshaw 1978, this paper). Furthermore, tree fruit production is more regular than grass seed production in arid environments, as woody plants are less dependent on the irregular rains due to their capability of obtaining water from deeper soil levels (Walker and Noy-Meir 1982).

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**Extrapair feeding in Pied-billed Grebes.**—Two forms of cooperative rearing through feeding of chicks have been reported for grebes. These are (1) young from first broods feeding siblings from a second brood (Cramp and Simmons 1977) and (2) adults, other than pair members, feeding chicks from a single brood (Lane 1978, Forbes 1985). This latter form has been termed extrapair feeding (Forbes 1985).

On 19 June 1982, I observed 3 adult Pied-billed Grebes (*Podilymbus podiceps*) feeding 5

chicks. All 3 adults were in breeding plumage. Sex of the paired birds was determined by relative body and bill size (Palmer 1962), but the sex of the third adult was not known. Hereafter, I shall refer to the 3 adults as either the male, the female, or the extra adult.

From 17:05 to 19:55, I was in a floating blind (cf. Nuechterlein 1981) in a freshwater impoundment of the Chignecto National Wildlife Area near Amherst (45°50'N, 64°12'W), Nova Scotia. I determined that 7 young had hatched earlier that month from a nest found nearby (<30 m) in a stand of cattail (*Typha* sp.).

At 17:15, I sighted 5 chicks, <10 days old, being fed by the male and the female. The brood moved to within 15–20 m of the blind. Adults surfaced primarily (16 of 22 dives) with 4–8 cm long sticklebacks (*Pungitius pungitius*). At 17:30, another adult moved to within 5 m of the brood and began foraging. I determined from the positions of the adults that all 3 adults were foraging and feeding the chicks. The extra adult fed at least 2 fish to the chick(s).

Foraging soon ceased, and all 3 adults loafed among the 5 chicks. The female swam away followed by all 5 young, which apparently responded to her neck-erect posture or her soft, grunting (Palmer 1962), vocalizations. Meanwhile, the male swam at the extra bird in an exaggerated neck-lowered posture similar to the threat postures of Horned Grebes (*Podiceps auritus*) (Storer 1969). The male and the extra bird then faced off (<1 m apart), with their necks lowered and s-shaped and their cheeks swollen. Both birds engaged in an intense binocular stare for over 20 s. After a brief “circle display” (Palmer 1962) with little pivoting by the birds, the male lunged at the extra adult; despite bill fencing, no nape grasp (McAllister and Storer 1963) resulted. Subsequently, the male drove away the extra adult through a series of flapping chases and returned to the female and her brood. I suggest that all chicks were siblings because they remained together throughout the entire observation period, and because they all responded to the supposed brooding call (Palmer 1962) of the female. Adoption in this solitary grebe should occur rarely. No other extra adults appeared near the brood that evening.

Infrequent feeding by extra adults (one occurrence out of 55 h of observation) should not be considered “helping” (sensu Emlen 1978) as benefit to the brood was trivial. If extra adults are not tolerated (Forbes 1985, this study), then benefits to the proposed helper are also questionable. Forbes (1985) reported males as extra adults during all 3 extrapair feedings in Western Grebes (*Aechmophorus occidentalis*), and he suggested that those males were attempting to procure mates. Support for courtship as a function of extrapair feeding comes from the following 3 lines of evidence: (1) extra males passed food directly to females, (2) paired males were aggressive to extra males (Forbes 1985), and (3) many species of grebes double-brood (Cramp and Simmons 1977). In this report, however, the extra adult passed food directly to the chick(s).

Perhaps extrapair feeding is simply a demand behavior that may be maladaptive given potentially injurious interactions with paired birds or loss of investment to unrelated young. I have twice seen adult Pied-billed Grebes pass prey to coot (*Fulica americana*) chicks. Obviously, such misdirected feeding is not beneficial to the grebe. The persistence of such behavior should be related to the costs associated with it. For example, extrapair feeding may occur more often in colonial grebes (e.g., *Podiceps nigricollis*) (Cramp and Simmons 1977) because identity of chicks can be frequently, albeit temporarily, uncertain. For grebes that practice obligate (e.g., *Podiceps cristatus*) (Cramp and Simmons 1977) or facultative (e.g., *P. podiceps*) (pers. obs.) brood division, extrapair feeding may entail only minor risks whenever there is only one attendant parent. Extrapair feedings involving only 2 adults (i.e., 1 parent) should be more frequent and more persistent. Such encounters have not been reported, probably because they are less obvious.

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**Foraging, scavenging, and other behavior of swallows on the ground.**—Swallows are aerial foragers that occasionally take prey from on the ground. To our knowledge, 6 species of swallows have been reported feeding on the ground in North America (Barn Swallows [*Hirundo rustica*], Bent 1942, Jackson and Weber 1975, Weber 1980; Cliff Swallows [*H. pyrrhonota*], Bank Swallows [*Riparia riparia*], Jackson and Weber 1975, Weber 1980; Tree Swallows [*Tachycineta bicolor*], Bent 1942, Erskine 1984; Purple Martins [*Progne subis*], Bent 1942; Northern Rough-winged Swallows [*Stelgidopteryx serripennis*], Wolinski 1980, Sealy 1982). Also, Erskine (1984) documented what he believed was ground foraging by Violet-green Swallows (*T. thalassina*). All of these sightings were isolated accounts that, for the most part, involved relatively few individuals. The importance and nature of this foraging behavior is poorly understood. We report ground foraging in 3 species of swallows in Manitoba, including large numbers of migrating Tree Swallows, and describe scavenging from artificial food patches and other nonforaging behavior of swallows that occurred on the ground.

*Methods.*—We observed swallows on the ground near the southern shore of Lake Manitoba and northern edge of Delta Marsh, Manitoba. From mid-July to late August 1985, several thousand migrating Tree and Bank swallows staged here. About 25 pairs of Barn Swallows nested on the study site, and approximately 100 Cliff Swallows were present in August.

We observed the swallows opportunistically from distances of 10–50 m. Upon encoun-